

2008 University of New Hampshire Research Plan of Work

I. Plan Overview

1. Brief Summary about Plan Of Work

The New Hampshire Agricultural Experiment Station (NH-AES) resides within the University of New Hampshire College of Life Sciences and Agriculture. It has the responsibility for the Hatch, McIntire Stennis, Animal Health, and Multi State Research Programs. This Plan of Work does not include New Hampshire Cooperative Extension, which is a separate administrative unit in New Hampshire. However, there is effective coordination of appropriate programs between the two units. Through the NH-AES Advisory Committee representing key stakeholder groups, we are working to facilitate constituent input and to improve our delivery of research findings to end users. The goal of our planned programs is to provide both basic and applied research to support increased knowledge to improve production, marketing and processing of American agricultural products. The New Hampshire AES has established as an outcome indicator increasing the effectiveness of basic and applied projects related to New Hampshire (NH) agricultural needs. Additionally, we use the increase in agricultural production in New Hampshire and income growth to New Hampshire farm operations as indicators. Based on the most recent data available from the USDA's New England Agricultural Statistics Service*, the number of NH farms remained stable at 3400 between 2003 and 2004 compared to 2800 farms in 1995. In 2005, total land in acres was 450,000 with the average size farm of 132 acres compared to the average size farm in 1996 of 145 acres. Between 2003 and 2004, the agricultural sector contribution to the State's Economy increased from \$195.4 to \$ 213.3 million-note (2005 data have not been reported to date). Total farm assets increased from \$1,098.0 to \$1148.3 million between 2003 and 2004, while total farm debt increased from \$119.5 to \$123 million dollars. We continue our philosophy that the mission of the Agricultural Experiment Station is greater than solely enhancing production agriculture and thus support basic and applied sciences that help position NH to 1) develop new agricultural products and jobs, 2) augment farm based and farm related industry, 3) provide opportunities for non traditional and sustainable farming endeavors such as the Organic Dairy, and 4) create opportunities for farm and rural community development. Each of these areas contributes to the development of a highly competitive and sustainable agricultural system for the global market. The NH Agricultural Experiment Station supports the following basic and applied projects to create technology and research for the benefit of the state, region and nation. We believe these projects provided valuable results, excellent return on the investment of AES funds, and a strategic position for the NH AES to successfully achieve our goals. The research findings, developments and technologies are and will be transferred through various mechanisms and working directly with our Intellectual Property Office in such forms as publications, patents, genomic data banks, technology transfer, policy recommendations and formation of spin-off companies.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	12.9	0.0
2009	0.0	0.0	12.9	0.0
2010	0.0	0.0	12.9	0.0
2011	0.0	0.0	12.9	0.0
2012	0.0	0.0	12.9	0.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel
- Expert Peer Review

2. Brief Explanation

The N. H. Agricultural Experiment Station has an External Advisory Committee, representing a diverse group (16 members) of stakeholders including representatives from industry, university and state and federal government. The group meets twice per year to exchange ideas for increasing this station's effectiveness in serving stakeholders and the citizens of our state. In addition, this committee reviews proposed programs and/or strategic plans. Scientific Peer Review All new research initiatives written as a 6 page proposal are reviewed by three to five external peer reviewers followed by an internal Research Advisory Committee composed of five faculty members from our college. The peer review process is as follows: There is an initial meeting with the NHAES and investigator to discuss the proposed project. If feasible, the investigator is encouraged to submit a proposal. Upon receipt of each project proposal that has been endorsed by the department chair, NHAES reviews it with respect to the proposal meeting all of the requirements; the appropriateness of the proposed research to the research mission, goals and programs of the NHAES and overall feasibility of performing the research. When a proposal meets these requirements, the proposal along with the peer review form is then sent to five external peer reviewers. The reviewers are asked to rate the proposal on scientific merit and appropriateness to the NHAES. The review form has 10 specific questions along with a section for written comments. Each proposal and reviews are first sent to the investigator who is asked to modify the proposal in response to the reviews. Each modified proposal along with the external reviews are sent to three of the five internal Research Advisory Committee. The committee is asked to rank the proposals in each of the following areas: scientific and technical merit; rationale of objectives and procedures; probability of success; previous year's progress report or productivity; and applicability to state and regional problems. When a project receives generally favorable ratings by both the external peer review and by the internal Advisory Committee, the project is approved as a NHAES project. External Peer Review Most projects receive feedback via manuscripts submitted to peer-reviewed journal and/or feedback when results are presented and/or discussed at workshops, regional, national or international meetings.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The planned programs are and will be based on input from stakeholder groups including scientists who have and will identify the most critical issues. Site visits, surveys, regional listening sessions, workshops, webpages and newsletters will be used to obtain input. Comments received from peer reviewed manuscripts and submitted grant proposals will be considered. Social Sciences and integrated efforts are largely contained in multi-state projects.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

Program 2: Sustaining Local Food Systems in a globalizing environment: non-traditional stakeholders are and will be involved in the farm to school program and the regional food communities Program 7: Improving Plant Food availability is targeting older adults and senior citizens in trying to increase intake of fruits, vegetables and whole grains.

3. How will the planned programs describe the expected outcomes and impacts?

The planned programs developed specific outcomes that will occur over five years. Impacts from these various programs will occur during the five years as well as beyond the five years. Specific progress of the outcomes and impacts from each planned program will be documented. Examples of the documentation include publications, presentations, books, reports to advisory committees, annual reports, progress reports, technical support, accession numbers of genome sequences, and newsletters.

4. How will the planned programs result in improved program effectiveness and/or efficiency?

At NHAES, research programs will continue to improve program effectiveness and/or efficiency. The results of the research programs will be monitored. Examples of effectiveness of the integrated programs are cited in the Planned Programs sections.

NHAES has emphasized and supported multi-investigator research particularly in areas where single laboratories can no longer provide the expertise for projects. The support of multi-investigators has resulted and will result in synergy and efficiency in use of resources. There are many advantages of multi-investigator projects including the use of shared resources and staff. The rapid advancement of technology has made many instruments and techniques prohibitive for individual laboratories or even for most individual departments. There is an economy of scale and justification for multidisciplinary research and/or purchasing high-end or high-throughput instrument for shared use by a research community.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Survey specifically with non-traditional groups
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder individuals
- Survey of selected individuals from the general public
- Other (Reviews from Submitted manuscripts)
- Survey of traditional stakeholder individuals
- Use of media to announce public meetings and listening sessions
- Targeted invitation to selected individuals from general public
- Survey of the general public
- Survey specifically with non-traditional individuals

Brief explanation.

Site visits will be used. Verbal and email feedback from idea/suggestions/proposals shared at annual scientific research and industrial, state, and/or federal government meetings. Workshops will be held and input, suggestions will be obtained, considered and used as appropriate. Interactive websites will be developed. Submit manuscripts for peer review and comments. Submit grant proposals for peer review and comments. Attend and present at professional regional, national and international meetings-questions, suggestions and input will provide feedback. Electronic feedback will be used and considered from E-newsletters.

2(A). A brief statement of the process that will be used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Open Listening Sessions
- Use Advisory Committees
- Other (Steering Committees)
- Use Surveys

Brief explanation.

The N. H. Agricultural Experiment Station has an External Advisory Committee, representing a diverse group (16 members) of stakeholders including representatives from industry, university and state and federal government . The group meets twice per year to exchange ideas for increasing this station's effectiveness in serving stakeholders and the citizens of our state. In addition, this committee reviews proposed programs and/or strategic plans. Workshops with stakeholder groups including biotechnology, forestry and equine have and will be held. NHAES also has an internal Advisory Committee comprised of seven members. This advisory committee has and will be reviewing strategic areas and initiatives of individual and multidisciplinary research in NHAES. NHAES established an Organic Dairy Steering Committee. The charge of this oversight committee is to review the academic, research, management and academic plans of the newly formed Organic Dairy Farm at the NHAES. Surveys have been done and will be done to assess proposed initiatives or strategic areas.

2(B). A brief statement of the process that will be used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Survey of traditional Stakeholder groups
- Survey of the general public
- Survey of selected individuals from the general public
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey of traditional Stakeholder individuals
- Meeting with invited selected individuals from the general public
- Meeting with the general public (open meeting advertised to all)
- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals

Brief explanation

In the different programs, methods for collecting stakeholder input is varied from either one method or several methods that are noted above. As examples, we invite input in response to electronic newsletters and we hold listening session in the counties of New Hampshire.

3. A statement of how the input will be considered

- Redirect Research Programs
- To Identify Emerging Issues
- To Set Priorities
- In the Staff Hiring Process
- In the Action Plans
- In the Budget Process

Brief explanation.

Input will be considered in the planning and implementation of research programs. Each research program will have and develop management, financial and academic programs.

V. Planned Program Table of Content

S. NO.	PROGRAM NAME
1	Agricultural & Food Biosecurity
2	Agricultural Systems
3	Animals & Animal Products
4	Biotechnology & Genomics
5	Economics & Commerce
6	Food, Nutrition & Health
7	Natural Resources & Environment
8	Pest Management
9	Plants & Plant Products

V(A). Planned Program (Summary)

1. Name of the Planned Program

Agricultural & Food Biosecurity

2. Brief summary about Planned Program

Project 1: Invasive species are considered the biggest threat to biodiversity besides habitat destruction (Schaal et al., 2003). In this project, molecular genetic methods will be used to examine the population structure of *Neosiphonia harveyi* and determine whether there have been one or several introductions of this species into the Gulf of Maine.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

- 136 50% Conservation of Biological Diversity
- 213 50% Weeds Affecting Plants

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Invasive algal species may alter local ecosystems, disrupting juvenile fish habitats or harming shellfish beds. Two nonindigenous algae that have been identified in the Gulf of Maine, the green algae *Codium fragile* ssp. *tomentosoides* and the red alga *Neosiphonia harveyi* are considered invasive species because of their recent explosive growth and negative impacts on local ecosystems.

2. Scope of the Program

- Multistate Research
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

If the mechanisms by which an introduced species becomes invasive, methods may be identified and used to control the spread of that species.

2. Ultimate goal(s) of this Program

This information will be useful to develop control methods to limit further introductions and spread of these and other invasive species.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	0.3	0.0
2009	0.0	0.0	0.3	0.0
2010	0.0	0.0	0.3	0.0
2011	0.0	0.0	0.3	0.0
2012	0.0	0.0	0.3	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Molecular markers will be developed to resolve population structure of *Neosiphonia harveyi*. These markers will be used to survey new and extant populations of the alga from Long Island through the Gulf of Maine. The genotypes of these populations will be compared to extant populations in Europe and Ireland and to populations in the Sea of Japan to determine whether there have been one or multiple introductions of the invasive alga in the Gulf of Maine, relative to the recent explosive expansion of this alga.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Other 1 (Laboratory Research) ● Other 2 (Field research) 	<ul style="list-style-type: none"> ● Other 1 (Peer Reviewed Publications) ● Other 2 (Grant proposal submissions) ● Web sites

3. Description of targeted audience

Scientists in the discipline and ecosystem managers.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	50	20	0	50
2009	50	20	0	50
2010	50	20	0	50
2011	50	20	0	50
2012	50	20	0	50

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	0	0
2009	0	0
2010	0	0
2011	0	0
2012	0	0

V(H). State Defined Outputs

1. Output Target

- Peer Review Publications

2008 :1 2009 :1 2010 :0 2011 :0 2012 :1

- Non peer reviewed publications including abstracts

2008 :2 2009 :2 2010 :2 2011 :2 2012 :1

V(I). State Defined Outcome

1. Outcome Target

Members of the general public identifying the algal in new locations along the Gulf of Maine

2. Outcome Type : Change in Action Outcome Measure

2008 :100 2009 : 100 2010 : 100 2011 :100 2012 : 100

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 213 - Weeds Affecting Plants

1. Outcome Target

Number of citations from publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :40 2009 : 40 2010 : 40 2011 :40 2012 : 40

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 213 - Weeds Affecting Plants

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Appropriations changes

Description

Loss of AES funding will result in this projected terminating.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Retrospective (post program)
- Before-After (before and after program)

Description

During the course of the program, algal populations will be collected from different locations in the Gulf of Maine. The genotypes of the populations will be compared to those from the origin of diversity (Sea of Japan) and other locations where the alga has been identified (Ireland, Europe). Submission of manuscripts and cDNA/gene sequences to NIH Gene bank will be submitted during the duration and after the course of the program.

2. Data Collection Methods

- Other (experiments)

Description

Molecular Laboratory Research and field sampling will be done. Twenty samples will be collected at each site where the *Neosiphonia harveyi* is located. Genotypes will be determined by DNA sequencing, or various assays for single nucleotide polymorphisms.

V(A). Planned Program (Summary)

1. Name of the Planned Program

Agricultural Systems

2. Brief summary about Planned Program

This program has two projects. One project considers the prospects for sustainable agriculture and integrated agricultural systems in four New England states. The project emphasizes intensive rotational grazing and related grass farming and livestock management to achieve the end of greater food self-sufficiency in the region. The second project will identify improved practices to protect water quality. New or improved production practices will be demonstrated to the farm community to help them to minimize any negative impacts on the environment.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

- 102 50% Soil, Plant, Water, Nutrient Relationships
- 131 10% Alternative Uses of Land
- 205 20% Plant Management Systems
- 307 20% Animal Management Systems

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Project 1: In recent years, the New England region has been producing less and less of its own regional food needs. This project seeks to rectify that deficiency. Project 2: If excessive nutrients move into surface or ground water, the impact will be statewide. New tools for nitrogen and phosphate management need to be developed or evaluated for New Hampshire.

2. Scope of the Program

- Multistate Extension
- In-State Extension
- Integrated Research and Extension
- In-State Research
- Multistate Integrated Research and Extension
- Multistate Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: Project will identify soils able to support strong pastures and healthy livestock and demonstrate methods of direct marketing of integrated plant and animal food products, thus protecting open space in the region. Project 2: Soil testing will continue to be used as a management tool.

2. Ultimate goal(s) of this Program

Project 1: To provide significant increase in New England regional food self-sufficiency while at the same time providing for the open space needs of the region's population. Project 2: Proper nutrient management will result in improved production and sound environmental practices.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	0.3	0.0
2009	0.0	0.0	0.3	0.0
2010	0.0	0.0	0.3	0.0
2011	0.0	0.0	0.3	0.0
2012	0.0	0.0	0.3	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Project 1: The potential for agricultural sustainability and food self-sufficiency and security in northern and central New England will be examined and researched with particular emphasis on pasture and grazing potential and the integration of plant and animal agriculture to achieve agricultural/farm sustainability. Project 2: Field studies will be done to identify responses to added nutrients. Workshops will be held to illustrate/demonstrate improved practices. There will be demonstrations in the use of new/improved nutrient management tools.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● One-on-One Intervention ● Other 1 (Field Research) ● Education Class 	<ul style="list-style-type: none"> ● Newsletters ● Web sites ● Other 1 (Peer Reviewed Publications)

3. Description of targeted audience

Project 1: All farmers and future farmers in the region and indirectly, all consumers of food in the region. Project 2: All farm producers in the state and the NH residents that do soil testing.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	800	9200	200	0
2009	2000	12200	200	0
2010	2000	14200	200	0
2011	2000	17200	200	0
2012	2000	16000	200	0

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	0	0
2009	2	0
2010	0	0
2011	0	0
2012	2	0

V(H). State Defined Outputs

1. Output Target

- Peer Reviewed Publications

2008 :0 2009 :2 2010 :0 2011 :2 2012 :2

- Chapters in Books

2008 :0 2009 :2 2010 :0 2011 :2 2012 :0

- Author of Book or Editor

2008 :0 2009 :1 2010 :0 2011 :1 2012 :0

- Non-peer reviewed publications including abstracts

2008 :12 2009 :12 2010 :12 2011 :12 2012 :12

V(I). State Defined Outcome

1. Outcome Target

Change in farming practice

2. Outcome Type : Change in Condition Outcome Measure

2008 :150 2009 : 150 2010 : 150 2011 :150 2012 : 150

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Change in food consumption patterns

2. Outcome Type : Change in Action Outcome Measure

2008 :300 2009 : 300 2010 : 300 2011 :300 2012 : 300

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Change in public policy

2. Outcome Type : Change in Condition Outcome Measure

2008 :2 2009 : 1 2010 : 1 2011 :1 2012 : 1

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land
- 307 - Animal Management Systems

1. Outcome Target

Regulators increase knowledge

2. Outcome Type : Change in Action Outcome Measure

2008 :50 2009 : 25 2010 : 25 2011 :25 2012 : 25

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Change in percent of agricultural land

2. Outcome Type : Change in Action Outcome Measure

2008 :10 2009 : 10 2010 : 10 2011 :10 2012 : 10

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Change in on-farm biodiversity

2. Outcome Type : Change in Condition Outcome Measure

2008 :10 2009 : 10 2010 : 10 2011 :10 2012 : 10

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Producers use soil testing.

2. Outcome Type : Change in Action Outcome Measure

2008 :500 2009 : 50 2010 : 100 2011 :100 2012 : 100

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems

1. Outcome Target

Change in support for small-scale farms

2. Outcome Type : Change in Condition Outcome Measure

2008 :100 2009 : 200 2010 : 250 2011 :250 2012 : 250

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

1. Outcome Target

Change in farmer income

2. Outcome Type : Change in Action Outcome Measure

2008 :10 2009 : 50 2010 : 500 2011 :500 2012 : 500

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 131 - Alternative Uses of Land
- 205 - Plant Management Systems
- 307 - Animal Management Systems

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Appropriations changes
- Populations changes (immigration,new cultural groupings,etc.)
- Natural Disasters (drought,weather extremes,etc.)
- Economy
- Government Regulations

Description

One or more factors may adversely or positively effect the outcome of the projects.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Before-After (before and after program)
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.

Description

Project 1: Studies of land use change, with particular emphasis on change in pasture acreage and reduction in the decline of farm acreage and farm numbers. Specific measures to be conducted to obtain information on change in agricultural acreage and farm numbers. Project 2: Surveys at various times during the project. Workshop participants will be surveyed to evaluate the project. Soil testing will be observed. Increase in the use of improved practices will be observed.

2. Data Collection Methods

- Unstructured
- Structured
- Journals
- Observation
- Case Study
- Other (Field sampling;)

Description

Project 1: Qualitative case studies of individual farms and farm experience are important. These involve controlled observation and assessment, based on interviews, studies of the literature, and multiple farm visits over time. Project 2: Soil test results will be collected and analyzed. Survey producers and evaluate/analyze the results.

V(A). Planned Program (Summary)**1. Name of the Planned Program**

Animals & Animal Products

2. Brief summary about Planned Program

Project 1: Methodologies for domestication and hatchery production of Atlantic cod have and will be developed for culture in coastal New Hampshire waters. Project 2: The viability of stallion sperm will be examined in attempts to identify the optimal procedures for cooling and/or freezing semen for use in artificial insemination. Project 3: This project seeks to define the biochemical pathways mediating cone visual transduction so that new treatments can be designed to preserve vision and prevent retinal degeneration and blindness in humans and animals. Project 4: This project seeks to identify molecular mechanisms that regulate adipocyte development and function by addressing signal transduction systems. Project 5: This project is examining the molecular mechanisms in clams that have leukemia. Project 6: This project seeks to improve juvenile grow out stage to reduce growth variation and maximize growth and survival. The second focus is on increasing effectiveness of out planting approaches to increase survival and production of harvestable urchins.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

- 135 5% Aquatic and Terrestrial Wildlife
- 301 15% Reproductive Performance of Animals
- 302 5% Nutrient Utilization in Animals
- 304 5% Animal Genome
- 305 50% Animal Physiological Processes
- 307 5% Animal Management Systems
- 308 5% Improved Animal Products (Before Harvest)
- 311 5% Animal Diseases
- 702 5% Requirements and Function of Nutrients and Other Food Components

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Project 1: Development of fish species for nearshore aquaculture will enhance those fish such as Atlantic cod that have been overfished and the fisheries highly regulated. Project 2: This project will improve the viability of stallion sperm. Currently, the sperm of some stallions does not survive well during cooling or freezing. Also fertility is typically 10% lower for sperm that have been cooled and even lower for sperm that have been frozen. Project 3: The understanding of the basic biology of cone photoreceptors is much more limited than for rod photoreceptors, in part because cones are less abundant than rods in most mammalian retinas. However, some retinal diseases involve preferential degeneration of cone photoreceptors, resulting in loss of visual acuity and color discrimination. This work will provide fundamental information for better understanding how cone photoreceptors differ from rod photoreceptors, and how to develop better treatments for retinal diseases that afflict humans and domestic and livestock animals. Project 4: Obesity is reaching epidemic levels in this country. Obesity is a risk factor for many pathological conditions--i.e. heart disease, NIDDM and cancer as examples. Project 5: The understanding of the molecular basis for a naturally occurring molluscan disease (leukemia) will eventually lead to the development of treatment and indications of treatments of leukemia in humans. Project 6: Sea urchin aquaculture represents a new economic enterprise for New England with the potential to benefit coastal communities. Several bottlenecks, particularly the juvenile grow out phase for out planting, must be addressed for it to succeed.

2. Scope of the Program

- Multistate Research
- In-State Research
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: Various populations as determined by genetic analysis of Atlantic cod will be available for these studies. Project 2; Improvements in fertility with cooled/refrigerated and frozen sperm will be forthcoming. Project 3: The operating hypothesis is that visual transduction in cone photoreceptors will differ in discrete ways that can be quantified by examining the central enzyme of the pathway, phosphodiesterase. Project 4: Cell models will mimic or recapitulate processes that are occurring. Future work will seek animal models such as rodents so that the assumption is that in vivo animal models hold true for processes that occur in humans. Project 5: Understanding clam leukemia at the molecular level will permit us to prevent or treat the disease. Fishermen will benefit and clam beds closed for years in NH can be opened and utilized again. Project 6: The major approaches for sea urchin cultivation are known and well documented, but adapting these approaches to local conditions must be developed.

2. Ultimate goal(s) of this Program

Project 1: To improve our capability of spawning and raising Atlantic cod and offer much needed diversification for fish farmers in the northeastern U.S. Project 2: To improve fertility of refrigerated and frozen stallion spermatozoa. Project 3: To define the biochemical pathway responsible for cone vision, so that defects in vision in animals and humans that result from impaired functioning of cone photoreceptors may be therapeutically treated. Project 4: To define mechanisms that regulate adipocyte differentiation and function. Project 5: To be able to successfully treat large numbers of soft shell clams affected by leukemia. Leukemia has devastated clam beds in northeastern US and Canada. Project 6: To develop an economically viable sea urchin aquaculture industry in the New England Region.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	1.5	0.0
2009	0.0	0.0	1.5	0.0
2010	0.0	0.0	1.5	0.0
2011	0.0	0.0	1.5	0.0
2012	0.0	0.0	1.5	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

For all projects: Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students and/or postdoctoral fellows. There will be development and maintenance of websites. Presentations will be made to various traditional and non-traditional stakeholders. Project 1: Physiological and endocrinology research will be performed in Atlantic cod. Project 2: Physiological research will be performed on stallion sperm. Project 3: Biochemical research will be performed using frog and mammalian rods and cones. Preparation of antigen-specific antibodies will be done. Project 4: Cellular and molecular methods will be used to understand the molecular mechanisms of adipocyte differentiation and metabolic function. Project 5: Molecular studies on clam leukemia will be done. Workshops and open forums will be held for fishermen on clam leukemia. Project 6: Conduct growth studies on hatchery produced juvenile sea urchins to improve growth and survival. Conduct studies to reduce growth variation in juvenile urchins during grow out. Conduct studies to increase survival of our planted urchins. Promote sea urchin aquaculture by using hatchery as a demonstration facility and collaboration with interested parties.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Other 1 (Laboratory Research) ● Workshop ● One-on-One Intervention ● Demonstrations ● Education Class ● Other 2 (Field research) 	<ul style="list-style-type: none"> ● Web sites ● Other 1 (Peer reviewed publications) ● Other 2 (Presentation)

3. Description of targeted audience

Target audience will include students university classrooms, K-12 and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences. For one project, there will be a continued participation on the Sea-Urchin Zone Council (Maine) and participation in meetings and workshops.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	700	4500	50	25
2009	700	4500	50	25
2010	1000	4500	50	25
2011	1000	4500	50	25
2012	1000	4500	50	25

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :1 2010 :0 2011 :1 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	11	0
2009	11	0
2010	11	0
2011	9	0
2012	9	0

V(H). State Defined Outputs

1. Output Target

- Peer Reviewed Publications

2008 :11 2009 :11 2010 : 11 2011 :9 2012 :9

- Chapters in books

2008 :0 2009 :1 2010 :0 2011 :0 2012 :1

- Non peer reviewed publications including abstracts

2008 :8 2009 :8 2010 :8 2011 :5 2012 :5

V(I). State Defined Outcome

1. Outcome Target

Number of published Publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :11 2009 : 11 2010 : 11 2011 :9 2012 : 9

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Citations

2. Outcome Type : Change in Condition Outcome Measure

2008 :150 2009 : 300 2010 : 300 2011 :300 2012 : 300

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)

- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of submissions of grant proposals

2. Outcome Type : Change in Action Outcome Measure

2008 :4 2009 : 5 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components

1. Outcome Target

Average Impact factor of publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :1 2009 : 2 2010 : 2 2011 :2 2012 : 2

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of Aquaculturists learning ovulation induction methods

2. Outcome Type : Change in Action Outcome Measure

2008 :50 2009 : 112 2010 : 130 2011 :150 2012 : 150

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals

- 308 - Improved Animal Products (Before Harvest)

1. Outcome Target

Number of youths and adults attending educational classes/workshops

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :50 2009 : 50 2010 : 50 2011 :50 2012 : 50

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 304 - Animal Genome
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of specific antibodies generated

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 2009 : 5 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)

1. Outcome Target

Number of oral/poster presentations at meetings

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :50 2009 : 50 2010 : 50 2011 :50 2012 : 50

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components

1. Outcome Target

Number of graduate students trained

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 2009 : 5 2010 : 5 2011 :6 2012 : 6

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife

- 301 - Reproductive Performance of Animals
- 302 - Nutrient Utilization in Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 311 - Animal Diseases
- 702 - Requirements and Function of Nutrients and Other Food Components
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of educational workshops held

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 2009 : 5 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 308 - Improved Animal Products (Before Harvest)
- 702 - Requirements and Function of Nutrients and Other Food Components
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of fishermen who have been trained in the treatment of leukemia

2. Outcome Type : Change in Action Outcome Measure

2008 :20 2009 : 20 2010 : 20 2011 :20 2012 : 20

3. Associated Knowledge Area(s)

- 305 - Animal Physiological Processes
- 311 - Animal Diseases

1. Outcome Target

Collaborations in sea urchin hatchery development

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1 2009 : 2 2010 : 2 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 305 - Animal Physiological Processes
- 307 - Animal Management Systems

1. Outcome Target

Collaborations on juvenile grow out

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :3 **2009 : 3** **2010 : 3** **2011 :0** **2012 : 0**

3. Associated Knowledge Area(s)

- 305 - Animal Physiological Processes
- 307 - Animal Management Systems

1. Outcome Target

Participation in Fisheries Management Council

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1 **2009 : 1** **2010 : 1** **2011 :0** **2012 : 0**

3. Associated Knowledge Area(s)

- 305 - Animal Physiological Processes
- 307 - Animal Management Systems

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Other (Power failures)
- Competing Programatic Challenges
- Natural Disasters (drought,weather extremes,etc.)
- Appropriations changes
- Public Policy changes
- Government Regulations
- Economy

Description

A variety of external factors either as a single factor or combination may have adverse effects on projects. New findings and results that alter priorities and approaches.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Time series (multiple points before and after program)
- Before-After (before and after program)
- During (during program)

Description

During each project, data are analyzed and research is evaluated. Successful development and use of molecular, microscopic, biochemical and physiological techniques are measures of successful research. Success of peer reviewed publications indicates success during and after the program. Successful submission and approval of externaly funded grants. Economic analysis of results versus costs in labora and facilities.

2. Data Collection Methods

- Sampling

Description

Data collection uses physiological, molecular, cellular biochemical, and microscopic research. Specific examples include real time PCR; northern analysis; western analysis; immunocytochemistry; TUNEL apoptotic assay; statistical methods; immunoblot analysis for gene expression; binding assays; protein purification; and cell membrane integrity assays.

V(A). Planned Program (Summary)**1. Name of the Planned Program**

Biotechnology & Genomics

2. Brief summary about Planned Program

Project 1: This multi-PI project studies the continuum of relationships between bacteria and nematodes that range from symbiotic cooperation to attack insects to antagonism, where one partner kills the other. Fundamental mechanisms are being identified that govern these relationships with the hope to better understand and design natural biological control agents. Project 2: This project is concerned with developing genomic and germplasm resources, and applying them to the improvement of horticultural crops, with emphasis on strawberry and mint. Project 3: This project will characterize the PUF3 protein and its interaction with the CCR4-NOT complex as to their mechanism of action in controlling mRNA degradation in yeast. Project 4: This project will characterize mutations in genes that regulate the phosphorylation state of plant proteins and are likely contributors to overall plant growth & development. Project 5: This project is aimed to identify genes underlying commercially important traits in tilapia and to support the selective breeding to improve strains for aquaculture. Project 6: This project will be determining the correlation between protein charge and protein functional properties. Of particular interest is the role of charge in beta lactoglobulin gelatin (food texturizer) and IgG solubility (immunotherapeutics). Project 7: This project seeks to understand the role of polyamines in plant stress and the regulation of polyamine biosynthesis. Project 8: This project will develop and design gonadotropin-releasing hormone analogs as possible chemicals to sterilize fish and to determine the effects of recombinant hormone on reproductive activity. Project 9: This project will develop tools that will allow genetic analysis of Frankia physiology and their interactions with plants. Project 10: This project will investigate the genetic factors that influence the beneficial associations of microbes with animals.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

- 135 10% Aquatic and Terrestrial Wildlife
- 201 10% Plant Genome, Genetics, and Genetic Mechanisms
- 203 10% Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 10% Basic Plant Biology
- 212 10% Pathogens and Nematodes Affecting Plants
- 303 10% Genetic Improvement of Animals
- 304 10% Animal Genome
- 305 10% Animal Physiological Processes
- 511 10% New and Improved Non-Food Products and Processes
- 711 10% Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Project 1: Invasive pests threaten sustainable agriculture, so it is a priority to identify new sustainable biological control agents. Project 2: Horticultural productivity is constantly threatened by disease and abiotic stress. Opportunities exist to improve product quality. Genetic solutions are powerful and environmental friendly. Project 3: Characterizing conserved components involved in mRNA degradation may impact our understanding on how genes and proteins are expressed. Project 4: Understanding plant growth and development at all levels, from the molecular to the agricultural, contributes to our ability to improve food production. Project 5: Although tilapia consumption in the US is rising at about 30% per year, almost all of this product is imported, increasing the U.S.A. trade deficit for seafood. Project 6: B-lac is a widely used food texturizer, but genetic variants exhibit very different gelatin properties. IgG therapeutics are widely used, but their stability and solubility are limiting many applications. Project 7: Abiotic plant stress is a major area of research; this project seeks to understand the molecular events related to plant stress and its effects on metabolism. Project 8: Gaining a further understanding of GnRH, its analogs, its receptors, interactions with

neurotransmitters and microencapsulation will be critical for the development of novel strategies for improving and controlling reproduction. Project 9: Importance of this project includes reclamation, reforestation, bioremediation, fuel and stabilization. Project 10: Beneficial microbes are ubiquitous and yet their role in health is poorly understood. It is a priority in animal & human health to utilize beneficial microbes instead of chemicals & antibiotics to improve health & combat disease.

2. Scope of the Program

- Multistate Research
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: Laboratory studies of bacterial-nematode interactions predict future utility in the field. Project 2: Molecular tools will become increasingly attractive to plant breeders. Environmental challenges and new product opportunities will be ongoing and open ended. Project 3: mRNA degradation in yeast is evolutionarily conserved and related to higher eukaryotic mRNA degradation. Project 4: An in-depth understanding of protein phosphatase activity in plants and its role in plant development will lead to improvements in agriculture. Project 5: Genetically improved strains of tilapia will increase production efficiency and lower costs to consumers. Project 6: Assumes IgG therapeutics will be of increasing importance in the treatment and diagnosis of animal diseases. Assumes b-lac will continue to be a widely used food texturizer. Project 7: Plant varieties resistant/tolerant to various forms of abiotic stress such as salt, water, AI can be produced by genetic manipulation of plant metabolism. Project 8: GnRH is the master control of reproduction in all vertebrates and thus is available for various manipulations. Project 9: Technology can be transferred to the field. Project 10: General principles gained with this model will apply to complex systems & other animal models.

2. Ultimate goal(s) of this Program

Project 1: To control invasive pests by better understanding of bacterial-nematode interactions. Project 2: To develop genomic and germplasm resources for horticultural crops. To translate these basic resources into applicable tools for plant breeders. Project 3: To determine if PUFs controls SUN4 mRNA deadenylation by binding to the SUN4 3' UTR. To test the hypothesis that PUFs accelerates deadenylation by recruiting the CCR4-NOT complex. Project 4: To understand the interconnections between protein phosphorylation and plant growth and development. Project 5: To produce a higher quality tilapia, at lower costs to the consumers. Project 6: To make charge determinations a standard measurement for controlling protein functional properties. Project 7: To produce AI, salt and drought tolerant plants. Project 8: One of the ultimate goals is to develop an alternate method of sterilizing male sea lampreys using a lamprey GnRH antagonist. Project 9: To increase beneficial traits of plant symbiosis. Project 10: To improve the health of humans, and domestic livestock & animals using beneficial microbes instead of chemicals and antibiotics.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	2.1	0.0
2009	0.0	0.0	2.1	0.0
2010	0.0	0.0	2.1	0.0
2011	0.0	0.0	2.1	0.0
2012	0.0	0.0	2.1	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

For all projects: Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students

and/or postdoctoral fellows. There will be development and maintenance of websites. Presentations will be made to various traditional and non-traditional stakeholders. Project 1: Research interactions between three different bacterial taxa and *Caenorhabditis* nematodes. Project 2: Submission of over 2 million bp DNA sequences to GenBank; Contribution of germplasm to USDA germplasm system; Project 3: Using molecular biological techniques to study mRNA degradation in yeast. Project 4: Research the role of protein phosphatase genes in the model plant *Arabidopsis* using molecular and biochemical techniques. Project 5: Genetic mapping will be used to identify genes underlying sex differentiation and skin color of tilapia. Project 6: Measure charge on beta-lac A & beta-lac B under varying solvent conditions. Project 7: Conduct research on manipulation of gene expression and study its impact on plant cell response. Project 8: Perform molecular, biochemical and physiological research; analyze data and screen genomes. Project 10: Research genes involved in beneficial microbial association; understand how beneficial microbes maintain association & prevent pathogenic associations with animals.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● One-on-One Intervention ● Demonstrations ● Workshop ● Other 1 (Laboratory Research) ● Other 2 (Field Research) 	<ul style="list-style-type: none"> ● Web sites ● TV Media Programs ● Other 1 (Peer reviewed publications) ● Other 2 (Invited speakers, workshops, sem) ● Newsletters

3. Description of targeted audience

Target audience will include students, university classrooms, K-12 and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences or workshops.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	2100	4550	205	150
2009	2950	4400	255	150
2010	2950	4400	255	150
2011	2950	4400	255	150
2012	2950	4400	255	150

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :3 2009 :2 2010 : 1 2011 :2 2012 :2

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	21	0
2009	25	0
2010	24	0
2011	26	0
2012	25	0

V(H). State Defined Outputs**1. Output Target**

- Peer-reviewed manuscripts

2008 :21 2009 :25 2010 : 24 2011 :26 2012 :25

- Chapters in Books

2008 :2 2009 :3 2010 : 2 2011 :3 2012 :2

- Author of book or editor

2008 :0 2009 :0 2010 : 1 2011 :0 2012 :1

- Non peer reviewed publications including abstracts

2008 :28 2009 :28 2010 : 28 2011 :28 2012 :25

- Identity and submission of cDNA, ESTs,proteins, genes, RNA to GenBank

2008 :50 2009 :50 2010 : 50 2011 :50 2012 :50

V(I). State Defined Outcome**1. Outcome Target**

Peer Reviewed Publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :25 2009 : 25 2010 : 25 2011 :25 2012 : 25

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes

- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Public understanding of Microbial opportunists

2. Outcome Type : Change in Action Outcome Measure

2008 :200 2009 : 200 2010 : 200 2011 :200 2012 : 200

3. Associated Knowledge Area(s)

- 212 - Pathogens and Nematodes Affecting Plants

1. Outcome Target

Number of farmers considering biological control

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :15 2009 : 20 2010 : 25 2011 :30 2012 : 30

3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 212 - Pathogens and Nematodes Affecting Plants
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number of Readers of Peer Reviewed Publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :500 2009 : 500 2010 : 500 2011 :500 2012 : 500

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number in audience of class or scientific meeting

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :6000 2009 : 6000 2010 : 6000 2011 :6000 2012 : 6000

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number of Graduate students trained in laboratories

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :25 2009 : 25 2010 : 25 2011 :25 2012 : 25

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number of undergraduate students trained in laboratory; involved in investigations

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :40 2009 : 40 2010 : 40 2011 :40 2012 : 40

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number of grant submissions

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :30 2009 : 30 2010 : 30 2011 :30 2012 : 30

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

1. Outcome Target

Number of meetings/workshops attended

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :55 2009 : 55 2010 : 55 2011 :55 2012 : 55

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 206 - Basic Plant Biology
- 212 - Pathogens and Nematodes Affecting Plants
- 303 - Genetic Improvement of Animals
- 304 - Animal Genome
- 305 - Animal Physiological Processes
- 511 - New and Improved Non-Food Products and Processes
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Competing Public priorities
- Appropriations changes
- Government Regulations
- Public Policy changes
- Natural Disasters (drought, weather extremes, etc.)
- Competing Programmatic Challenges
- Economy

Description

One or a combination of external factors can adversely or positively affect the outcome of each project or program.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Before-After (before and after program)

Description

During each project, data are analyzed and research is evaluated. Successful development of molecular, biochemical, genomic and physiological techniques. Success of peer reviewed publications indicates success during and after the program. Successful submission and approval of external funded grants.

2. Data Collection Methods

- Other (Laboratory and Field research)
- Sampling

Description

Data collection uses physiological, molecular, cellular biochemical, genomic and microscopic research. Specific examples include real time PCR; PCR, Southern blots; northern analysis; western analysis; immunocytochemistry; ; statistical methods; immunoblot analysis for gene expression; binding assays; protein purification and sequencing; cloning and sequencing of DNA/RNA sequences; bioinformatics; gel electrophoresis; microarray studies; 2-D gels; and MS-maldi.

V(A). Planned Program (Summary)

1. Name of the Planned Program

Economics & Commerce

2. Brief summary about Planned Program

Project 1: A cost/benefit analysis will be conducted to determine the efficiency of drawing corporate off-shore functions to rural communities and to retired senior citizens.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

- 602 10% Business Management, Finance, and Taxation
- 603 20% Market Economics
- 608 20% Community Resource Planning and Development
- 610 20% Domestic Policy Analysis
- 611 20% Foreign Policy and Programs
- 803 10% Sociological and Technological Change Affecting Individuals, Families and Communities

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Rural communities in NH are in need of meaningful employment opportunities. Corporate America has indicated a need for specific skill sets. The match needs to be facilitated to create opportunities in rural communities.

2. Scope of the Program

- Integrated Research and Extension
- Multistate Integrated Research and Extension
- Multistate Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: Based on a previous survey, nearly 3/4ths of the corporations engaged in outsourcing stated that they were interested in offering positions now being outsourced overseas to rural communities in the USA.

2. Ultimate goal(s) of this Program

Project 1: To link corporate needs with community skill sets for specific target groups: 1) retired individuals wishing to work part-time; 2) caregivers in family wishing to work part time; and 3) individuals wishing to strengthen their resume in several aspects.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0
2010	0.0	0.0	0.0	0.0
2011	0.0	0.0	0.0	0.0
2012	0.0	0.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Project 1: Corporate needs will be matched with targeted community groups (possessing needed skillsets/talents).

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Workshop ● One-on-One Intervention ● Other 1 (targeted letters) 	<ul style="list-style-type: none"> ● Web sites ● Public Service Announcement ● Other 1 (peer reviewed publications)

3. Description of targeted audience

Corporations indicating an interest in rural sourcing. Target groups interested in part-time or full-time employment. Policy makers, decision makers and researchers statewide who have an interest in low income and/or rural populations.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	12000	10000	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	1	0
2009	1	0
2010	0	0
2011	0	0
2012	0	0

V(H). State Defined Outputs

1. Output Target

- Peer Review Publications

2008 :1 2009 :1 2010 :0 2011 :0 2012 :0

- Non peer reviewed publications including abstracts

2008 :1 2009 :0 2010 :0 2011 :0 2012 :0

V(I). State Defined Outcome

1. Outcome Target

Peer Reviewed publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :1 2009 : 1 2010 : 0 2011 :0 2012 :0

3. Associated Knowledge Area(s)

- 608 - Community Resource Planning and Development
- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities

1. Outcome Target

Obtaining additional funding to conduct detailed cost benefit analysis to select NH communities

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1 2009 : 1 2010 : 0 2011 :0 2012 :0

3. Associated Knowledge Area(s)

- 803 - Sociological and Technological Change Affecting Individuals, Families and Communities

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Government Regulations
- Economy
- Competing Programatic Challenges
- Other (limited internal funding)
- Public Policy changes
- Populations changes (immigration,new cultural groupings,etc.)

Description

One or more external factors may have adverse or positive effects on program.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Time series (multiple points before and after program)
- Before-After (before and after program)
- During (during program)

Description

Project 1: Subject to success in external funding requests, follow up surveys to obtain employee behavioral characteristics of targeted community groups will be developed. These surveys will provide information necessary for the corporate community to make favorable community target based decisions regarding employment.

2. Data Collection Methods

- Other (web based surveys)
- Case Study
- Whole population

Description

Web based linkage will be developed; extension based linkage will be evaluated for potential; and the possibility of extension offering the linkage via educational programs and seminars. Use secondary industry interaction data from Dept of Commerce, BEA and IMPLAN software. Collect secondary town tax and state data electronically from agency websites; use e-mail surveying software for rural resident data on skills and willingness to work from home via the internet.

V(A). Planned Program (Summary)**1. Name of the Planned Program**

Food, Nutrition & Health

2. Brief summary about Planned Program

Project 1: This project will examine how the brain regulates the amount of zinc especially during periods of deficient or excessive zinc consumption. Project 2: This project will evaluate the relationships between breast milk levels of polybrominated diphenyl ethers (PBDEs) and stage of lactation maternal characteristics, dietary intake & environment of women in NH. Project 3: This project will seek to identify the cellular and molecular effects of elevated glucose levels on cardiovascular health in diabetic individuals. This research is focussed on the ways in which elevated blood sugar promotes a proinflammatory state that accelerates cardiovascular disease. Project 4: This project will evaluate the effectiveness & relative safety of biosolids, Class A, for reovirus contamination that are intended for land application. Project 5: This project will examine the early events of salmonella-host interactions. Project 6: This project will develop mechanisms to prevent Escherichia coli infections leading to hemolyticuremic syndrome. Project 7: This project will focus on identifying metabolic links that would explain the relationship of obesity and development of allergic disease and the factors that may contribute to this relationship.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

- 133 10% Pollution Prevention and Mitigation
- 304 5% Animal Genome
- 403 5% Waste Disposal, Recycling, and Reuse
- 607 5% Consumer Economics
- 702 25% Requirements and Function of Nutrients and Other Food Components
- 711 5% Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 25% Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 5% Zoonotic Diseases and Parasites Affecting Humans
- 723 10% Hazards to Human Health and Safety
- 724 5% Healthy Lifestyle

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Project 1: Zinc imbalance is suspected as a contributor to neurological disorders. This may result when healthy physiological processes that regulate the amount of zinc entering the brain malfunctions. We do not yet know how these regulatory processes work in the brain. Project 2: PBDEs are ubiquitous & persistent in our environment. They may disrupt hormone signals once inside the body. This project will biomonitor lactating women to estimate the body burden of PBDEs and explore potential health implications of this burden. Project 3: Knowing how diabetes accelerates cardiovascular disease can lead to methods of prevention and treatment. Project 4: Public acceptance of biosolids needs further research to gain confidence. Project 5: Despite extensive research food-associated illness due to salmonella continues to be a major health concern. Finding ways to reduce the incidence of this disease is a continuing priority. Project 6: Zoonotic pathogen is spread from cattle to various foodstuffs (sprouts, juices, processed meats, hamburger, etc.) through fecal contamination. Antibiotic treatment makes the condition worse. Our strategies will interrupt this cycle and look to improve human health and better acceptance of food products. Project 7: Incidence of asthma is 14%, a percentage that is highest in the New England area and above the national average.

2. Scope of the Program

- In-State Research
- In-State Extension
- Multistate Research
- Multistate Integrated Research and Extension
- Multistate Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: Brain zinc metabolism is similar in the human as in the pig. Zinc transport and metabolism in our blood-brain barrier model is similar to a living brain. Project 2: PBDEs will be present. Our subjects represent all NH women. Our lab will be functioning optimally. Project 3: The effects of abnormally high blood glucose levels on arterial health will be determined. The ways in which diabetes accelerates atherosclerosis will be better defined. Project 4: The findings will add to the data base on virus occurrence in Class A Biosolids. Project 5: Reducing the incidence of food-associated salmonellosis requires multiple intervention strategies. A focus on the early events in salmonella-host interactions can provide resources for developing such strategies. Project 6: Incidence of severe disease in children (infected from agricultural food products) is rising. The present work will profoundly affect this severe condition. Project 7: Finding a functional link will help delineate the mechanisms by which obesity may contribute to pulmonary disease such as allergic asthma.

2. Ultimate goal(s) of this Program

Project 1: To develop treatments for persons who are at risk of Alzheimer's Disease because their ability to regulate zinc transport at the blood-brain barrier is malfunctioning. Project 2: To biomonitor humans for PBDEs, which will increase our knowledge base on environmental chemicals. Project 3: To help develop drugs or lifestyle changes that can inhibit the adverse effects of elevated blood glucose levels on the cardiovascular system. Project 4: To help with the public acceptance of the land application of class A biosolids through research. Project 5: To reduce the incidence of food-associated salmonellosis, which will benefit both the consumer and the poultry industry. Project 6: Our molecular genetics and protein chemistry studies will result in greater and safer acceptance of food products. Project 7: To identify the mechanisms that would explain how weight gain in humans may promote pulmonary disease such as asthma.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	1.2	0.0
2009	0.0	0.0	1.2	0.0
2010	0.0	0.0	1.2	0.0
2011	0.0	0.0	1.2	0.0
2012	0.0	0.0	1.2	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

For all projects: Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students and/or postdoctoral fellows. There will be development and maintenance of websites. Presentations will be made to various traditional and non-traditional stakeholders. Project 1: The transport of zinc will be monitored using the laboratory model of the blood-brain barrier in conditions that are deficient or excessive in zinc. The relative abundance and location of specific zinc transport proteins will be measured in relation to the changes in kinetics to describe its regulation. Project 3: Research effects of

the elevated glucose in diabetes on cardiovascular disease, specifically atherosclerosis. Project 4: Two different biosolids prepared differently will be evaluated for virus. Project 5: To continue research on salmonella. Project 6: To do molecular and biochemical studies on E. coli Project 7: Work proposed will involve experimentation.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● One-on-One Intervention ● Other 1 (Laboratory research) ● Education Class ● Workshop ● Other 2 (One on one discussions) 	<ul style="list-style-type: none"> ● Newsletters ● TV Media Programs ● Other 1 (Peer reviewed publications) ● Public Service Announcement

3. Description of targeted audience

Target audience will include students, university classrooms, K-12 and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences. Project 1: Nutritional scientists, teachers and clinicians Project 2: Scientists interested in obesity, environmental chemicals, breastfeeding & infant development. All lactating mothers in NH/New England. Project 3: all scientists in discipline; students and general public interested in better health Project 4: Farmers, homeowners, scientists Project 5: Scientists in the field Project 6: All scientists, researchers, medical personnel, farm organizers, Abattoir systems. Project 7: General public, health community, scientific community

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	1700	3070	10	0
2009	1700	3600	10	0
2010	600	2500	10	0
2011	600	2500	10	0
2012	600	2500	10	0

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :2 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	7	0
2009	7	0
2010	5	0
2011	5	0
2012	5	0

V(H). State Defined Outputs

1. Output Target

- Peer reviewed publications

2008 :7 2009 :7 2010 :5 2011 :5 2012 :5

- Chapters in Books

2008 :0 2009 :1 2010 :0 2011 :1 2012 :0

- Author of book or editor of book

2008 :0 2009 :1 2010 :0 2011 :1 2012 :0

- Non peer reviewed publications including abstracts

2008 :13 2009 :13 2010 :8 2011 :8 2012 :8

V(I). State Defined Outcome

1. Outcome Target

Peer Reviewed Publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :7 2009 : 7 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Number of graduate students trained

2. Outcome Type : Change in Action Outcome Measure

2008 :7 2009 : 7 2010 : 7 2011 :7 2012 : 7

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Number of Undergraduate students trained and/or performing investigations

2. Outcome Type : Change in Action Outcome Measure

2008 :5 2009 : 5 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety

1. Outcome Target

Number of presentations/posters at regional, national or international conferences or workshops

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :7 2009 : 7 2010 : 7 2011 :7 2012 : 7

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome

- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Number of Grant submissions

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 **2009 : 5** **2010 : 6** **2011 :6** **2012 : 6**

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Number of public presentations

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :7 **2009 : 7** **2010 : 7** **2011 :7** **2012 : 7**

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans

- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Model Development

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :7 2009 : 8 2010 : 8 2011 :8 2012 : 8

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 304 - Animal Genome
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 702 - Requirements and Function of Nutrients and Other Food Components
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins
- 722 - Zoonotic Diseases and Parasites Affecting Humans
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Town meetings

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 10 2010 : 0 2011 :10 2012 : 0

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 403 - Waste Disposal, Recycling, and Reuse
- 607 - Consumer Economics
- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.
- 723 - Hazards to Human Health and Safety
- 724 - Healthy Lifestyle

1. Outcome Target

Results to NH DES

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 1000 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occuring Toxins

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Other (Private sources)
- Natural Disasters (drought, weather extremes, etc.)
- Competing Programmatic Challenges
- Government Regulations
- Economy
- Competing Public priorities
- Appropriations changes
- Public Policy changes
- Populations changes (immigration, new cultural groupings, etc.)

Description

One or more external factors may have adverse or positive effects on the program.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Before-After (before and after program)
- Time series (multiple points before and after program)

Description

During each project, data are analyzed and research is evaluated. Successful development of various techniques. Success of peer reviewed publications indicates success during and after the program. Successful submission and approval of externally funded grants. Project 2: Sufficient data for publication. Examination of pregnant moms & fetuses. Project 3: Both cells in culture and animal models will be used to investigate the effects of abnormally high glucose levels on arterial cells and the development of atherosclerotic lesions. Project 4: Better public acceptance of land application of biosolids through research. Project 6: In-depth genetic/molecular/biochemical/protein chemistry interactions. Project 7: We will employ metabolic studies, biochemical assays and physiological assays to examine the relationship between obesity and asthma.

2. Data Collection Methods

- Sampling
- Tests
- Other (Lab and Field Research)
- On-Site
- Mail

Description

Data collection uses physiological, molecular, cellular, biochemical, and microscopic research. Project 2: Mail surveys and on-site surveys will be conducted. Examples of specific techniques include ELISA, RIA, EIA, western blot analysis of proteins; clinical assays; immunohistochemistry; image analysis; electron microscopy; light microscopy; cell culture; antibiotic assays; affinity binding assays; cell-cycle/apoptosis/necrosis assays; neutrophil apoptosis rate assays; real time RT-PCR; phenotypic & genotypic characterizations; pathogen culture; and lysogeny vs. pathogen stress assays.

V(A). Planned Program (Summary)**1. Name of the Planned Program**

Natural Resources & Environment

2. Brief summary about Planned Program

Project 1: This project will examine amphibian growth and survival in different upland habitat types. Project 2: This project will determine how trematode parasites affect nearshore marine species including benthic invertebrates, fish and birds. Project 3: This project plans to develop the tools for precise statements on water quality through rapid assessment using aquatic insects and to determine effects of forest management on abundance and richness of aquatic insect species. Project 4: This project compares and evaluates traditional digital image processing methods with some newly developed techniques to determine if the accuracy of the forest vegetation maps can be improved. Project 5: This project will perform inventories of the biodiversity of NH forests. Project 6: This project continues to compare aquatic and wetland plant diversity in tropical versus temperate regions. Project 7: This project will seek to improve techniques for quantifying and predicting forest composition and structure, including its response to management and new stressors (especially climate). In addition to growth and production of traditional forest products, we will also focus on structural legacies that are important for wildlife habitat. Project 8: This project has and will be examining how nitrogen deposition interacts with soil warming to alter soil microbial community. Project 9: This project will involve the monitoring and enhancement of shellfish restoration projects. Project 10: This project will seek to expand economic analysis for incentives to manage waste management; to examine prospects for privatization of public services; and to examine specific issues of construction and demolition debris. Project 11. This project has and will investigate the occurrence and causes of biotoxins in lakes and ponds. Project 12. This project will use genetic analysis to determine the influence of habitat disturbances on dispersal patterns of two species of vernal pool-breeding amphibians, the wood frog and the spotted salamander in southern New Hampshire. Project 13. This project seeks to determine the effects of different silviculture practices on the success of invasive shrubs. Project 14. This project seeks to understand how historic land uses affect soil structure and how these changes interact with high densities of white-tailed deer to facilitate invasions of exotic shrubs. Project 15. This project seeks to catalogue marine invertebrate biodiversity in the Gulf of Maine by producing high-quality genomic DNA vouchers, develop DNA barcodes based on mitochondrial cytochrome oxidase I sequences and integrate the results into an open access web page, linked to digital vouchers and GPS information. Project 16. This project will evaluate the species of seaweeds within different habitats in the Gulf of Maine, including rather pristine and stressed environments. In addition sites of high incidence of introduced seaweeds will be identified in order to characterize the sources and vectors of these introductions. Project 17. This project will assess the impact of different agricultural practices on water quality in heterogenous watersheds. Nutrient runoff from traditional dairy operations, an organic dairy, and manured fields will be compared to forested lands and suburban watersheds studied with different funding. Project 18. This project will extend its comprehensive stakeholder group studies and will allow for a better understanding of non-response error and in surveys across policy program and stakeholder groups. Project 19. This project will consider the effects of size, set and habitat type in determining the home range of lobsters.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

- 112 5% Watershed Protection and Management
- 122 10% Management and Control of Forest and Range Fires
- 123 10% Management and Sustainability of Forest Resources
- 132 10% Weather and Climate
- 135 20% Aquatic and Terrestrial Wildlife
- 136 20% Conservation of Biological Diversity
- 314 5% Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 5% Animal Welfare/Well-Being and Protection
- 403 5% Waste Disposal, Recycling, and Reuse
- 605 10% Natural Resource and Environmental Economics

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Project 1: In order to manage lands effectively, we need a realistic understanding of habitat requirements of species we are managing. Project 2: Marshes and estuaries are some of the most anthropogenically disturbed environments. Trematodes may provide a fast, integrative way to index their condition. Project 3: Rapid and accurate assessment of water quality by all stakeholder groups. Determine the effects of selective logging on aquatic insects in New England forests. Project 4: There is a strong need to map and monitor our forest resources, especially from remotely sensed data instead of just relying on ground measures. Project 5: Flora of forests on islands of large lakes are poorly studied. A need for understanding forests biodiversity is critical to conservation & protection. Project 6: The discovery under this project that temperate regions are more diverse than tropic in wetlands means we need to value our temperate aquatic and wetland habitats far more than we have in the past. Project 7: Quantifying and predicting present and future forest structures are critical steps in documenting sustainable forest management. Project 8: Forest productivity is dependent on nutrient cycling processes which may be modified by climate warming and nitrogen deposition. Project 9: Oyster populations in New Hampshire have declined 90% since 1995, and local extinctions have occurred in some areas. Because this species is one of the major habitat-producing species in NH estuaries, restoration efforts affect not only the oyster but many other species as well. Several local, state, and federal agencies support our work because of its importance. Project 10: Waste management/disposal costs have more than tripled in the past two decades. State and local governments need economic analysis of various management options. Project 11: Biotoxins (e.g. microcystins) are a growing threat to public health and recreation world-wide. Project 12: The insight into the effects of anthropogenic habitat disturbances on amphibian migration abilities, to be gained from this study, will be valuable in wetlands management. Long-term persistence of many amphibian populations will depend upon connectivity in the form of migration and gene flow between seasonal ponds. Project 13: Invasive, non-native shrubs have been shown to reduce rejuvenation of economically important forest trees. Such shrubs are increasing in abundance in mature and managed forests nationally. Project 14: Invasive shrubs threaten to disrupt forest regeneration and alter terrestrial communities. Project 15: This project will provide a baseline of the biodiversity of the Gulf of Maine and will allow for the recognition of alien/invasive species and shifts in invertebrate communities. Project 16: The study will aid in the management of valuable coastal resources plus minimize the introductions of non-indigenous seaweeds that can impact other economically important species. Project 17: Understanding the water quality impacts of agriculture in fragmented landscapes is important in land use planning and watershed management. Project 18: Successful management of natural and agricultural resources require active engagement and communication with stakeholders. Project 19: The lobster fishery is the most lucrative fishery in the Northeast. Our long-term goal is to provide sound scientific data so that we can better preserve this valuable resource.

2. Scope of the Program

- Multistate Extension
- In-State Extension
- Multistate Integrated Research and Extension
- Multistate Research
- Integrated Research and Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: There is a lack of information about upland habitat requirements for amphibians. Increased knowledge about upland habitat requirements will enhance our ability to manage lands more effectively for amphibians. Project 2: Trematodes may not

reflect all estuarine aspects equally. Project 3: Long-term monitoring of single-event human disturbance will generate a timeline of changing data. More accurate statements on predicted changes in water quality can be made together with documentation of the effects of logging and the time necessary for return to the baseline. Project 4: Forests can be mapped from digital imagery. Mapping forest vegetation is important. Project 5: Establish baseline data for island floras & to compare with future forest conditions. Project 6: Conservation in both temperate and tropical wetlands needs to become a greater focal point. The data from this project are critical. Project 7: Forests can be managed for economic and ecological attributes simultaneously. Project 9: Funding will remain constant and be supplemented by other programs. Project 10: Waste management will always be an issue as long as there are environmental concerns, public dollars, and insufficient private markets to fully deal with the problem. Project 11: Growing demand and use of lakes for recreation and drinking water causes increased importance of understanding and controlling the problem. Project 12: Gene flow patterns are assumed to be indicative of dispersal rates. Project 13: Interest in concern about and commitment to control invasive plants will increase over time. Non-native shrubs can be controlled. Funding will remain constant or increase. Project 14: Identify areas that may be especially vulnerable to plant invasions based on several features. Project 15: Sequence variations within species will be less than 2% so that species boundaries can be identified; at least 5 sequences of each species will be found; and universal Co-I primers will amplify products from all organisms. Project 16: Introduced/invasive species can be better contained or minimized based upon enhanced knowledge of their vectors and means of introductions. Project 17: Agriculture will continue to remain as a viable land use in NH. Project 18: The design and use and evaluation of specific tools for involving, engaging with these diverse stakeholder groups is complex. Project 19: The lobster fishery is healthy, but there is concern about over-fishing and depleting the resource. We have only a fair knowledge of lobster population dynamics and their habitat preferences. We also do not fully understand where new recruits to a given area arise.

2. Ultimate goal(s) of this Program

Project 1: To manage lands more effectively for amphibian species. Project 2: To understand how physical, chemical, and biological degradation of marshes and estuaries is reflected in trematode fauna. Project 3: To develop tools for rapid and accurate statements on water quality, which will lead to an increased ability to prevent or decrease pollution events. To determine the effects of forest management and the length of time for the aquatic ecosystem to return to pre-disturbance levels. Project 4: The goal is to show that more advanced digital image processing techniques are capable of generating highly accurate forest vegetation maps. Project 5: To establish the botanical diversity of island floras and community types. Produce baseline data. Project 6: To promote greater awareness of wetland diversity and the need for conservation in both temperate and tropical regions. Project 7: To improve management of economic and ecological attributes of forests. Project 8: To understand how climate change will impact forest ecosystems in the Northeast. Project 9: To reach the state goal of 20 acres of restored oyster bottom by 2010. Project 10: The goals are the ongoing analysis of solid waste management and reduction alternatives; working with local governments and NGOs to examine new policy options; to expand research to include more engineering and other physical science input. Project 11: Reduce the occurrence of biotoxins by understanding their causes. Project 12: To determine the effects of anthropogenic habitat disturbance on the migration abilities of vernal pool-breeding amphibians. Project 13: To promote silvicultural methods that minimize the invasion and impact on non-native shrubs on forest productivity and biological diversity. Project 14: To develop management protocols that limit spread of invasive shrubs. Project 15: To assess biodiversity in the Gulf of Maine; to have a webpage of biodiversity information of marine invertebrates including genetics, species and habitat data. Project 16: To help maintain diversity of critically important seaweed populations and reduce the occurrence of invasive/harmful taxa. Project 17: Reduce overall nutrient loading to streams in watersheds with mixed land use. Project 18: To develop and compare models for using and integrating qualitative and quantitative tools. To enhance the engagement and communication with specific stakeholder groups. Project 19: To measure lobster home ranges; to determine the factors that influence home ranges; to determine if sexually mature male and female lobsters express different movement patterns because of their differential responses to thermal gradients; and to use knowledge obtained to better assess populations and protect the fishery.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	6.0	0.0
2009	0.0	0.0	6.0	0.0
2010	0.0	0.0	6.0	0.0
2011	0.0	0.0	6.0	0.0
2012	0.0	0.0	6.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

For all projects: Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students and/or postdoctoral fellows. There will be development and maintenance of websites. Presentations will be made to various traditional and non-traditional stakeholders. Project 1: Field enclosures will be established in different upland habitat types in which to put metamorphic amphibians to examine growth and survival. Project 2: Online identification manuals, as well as hard copy identification manuals, as well as placement of species level data in online databases. Project 3: Develop and evaluate methods for more accurately mapping forest vegetation from digital remotely sensed imagery. Project 7: Re-measured, long-term forest plots will be used to refine models of forest growth and structural change. These models will be used to develop specific, applied guidance for forest stand management. Project 8: A website is being developed to inform NH residents on how global change may impact ecosystem goods and services. Project 9: Monitoring of existing restored shellfish will continue. Project 10: Participation in regional/local policy formulation. Project 11: Development of biotoxin monitoring program with NH DES and UNH Lakes Lay Monitoring and training in techniques for measuring biotoxins statewide. Project 12: Research population genetic structure and dispersal rates of spotted salamanders and wood frogs. Project 15: Development of an open access webpage with information on marine invertebrates of the Gulf of Maine including genetic, habitat, and species data. Project 16: The assessments of natural and introduced seaweed populations will be made within major embayments in northern New England. Stressed communities and introduced populations will be characterized, including causes and vectors. Explanations of these impacts will be documented and provided to diverse interest groups. Project 17: This project will quantify the effects of different agricultural practices on stream and tributary nutrient levels at three different sites. Project 19: Ultrasonic telemetry will be used to track the movements of lobsters within NH coastal waters. Mapping, SCUBA and other methods will help define their preferred habitats. GIS will be used to calculate home range size.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Education Class ● Other 1 (Field Research) ● One-on-One Intervention ● Demonstrations ● Group Discussion ● Other 2 (Laboratory research) ● Workshop 	<ul style="list-style-type: none"> ● Newsletters ● Other 2 (Presentations) ● Web sites ● Other 1 (Peer reviewed publications) ● Public Service Announcement

3. Description of targeted audience

Target audience will include students in university classrooms and K-12 and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences. Project 1: All scientists in the discipline, state and federal agency managers. Project 2: State level

community groups; scientists interested in use of freshwater. Project 3: Spatial data users, natural resource managers. Projects 4, 5: All scientists in field; conservation groups; state agencies. Project 7: All foresters in the state and all scientists in the discipline. Project 8: All scientists in the discipline; NH residents. Project 9: Oyster license holders; governmental managers, NGOs, and other scientists working on shellfish restoration. Project 10: State, local and regional waste management professionals; other researchers within discipline; general public. Project 11: State agencies (NH DES, NH Fish & Game); Lake Associations and Lake users. Project 12: Scientists interested in molecular ecology; landowners, foresters, and wildlife managers. Project 14: Forest land owners, foresters, loggers, conservation groups, land protection groups (land trustees, etc.) forest ecologists, silviculturists. Project 15: Ecologists, conservation biologists, resource managers, aquaculture farmers, fisheries biologists, and bio-security officers (e.g. customs officials); and specialists for invasive species control. Project 16: Users/consumers of coastal resources and habitats; managers and environmental agencies; and environmental advocate groups. Project 18: Policy makers, scientists, planning board, conservation commission, general public, elected officials, outdoor recreation participants and land owners. Project 19: Lobstermen, managers, lobster and marine biologists.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	6294	3528	150	480
2009	1202	4957	150	180
2010	1495	4220	180	80
2011	1595	4220	180	80
2012	1490	4220	180	80

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	32	0
2009	27	0
2010	20	0
2011	20	0
2012	20	0

V(H). State Defined Outputs

1. Output Target

- Peer-Reviewed Publications

2008 :32 2009 :27 2010 :20 2011 :20 2012 :20

- Chapters in Books

2008 :8	2009 :2	2010 : 3	2011 :2	2012 :2
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- Author of book or editor

2008 :3	2009 :1	2010 : 0	2011 :1	2012 :1
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- Non-peer reviewed publications including published abstracts

2008 :34	2009 :24	2010 : 24	2011 :24	2012 :24
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V(I). State Defined Outcome

1. Outcome Target

Peer Reviewed Publications

2. Outcome Type : Change in Action Outcome Measure

2008 :20	2009 : 20	2010 : 20	2011 :20	2012 : 20
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3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of Graduate Students trained

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :28	2009 : 26	2010 : 28	2011 :26	2012 : 26
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3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection

- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of Undergraduate students trained and/or performing investigations

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :27 2009 : 27 2010 : 27 2011 :27 2012 : 27

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of presentations/posters at regional, national or international conferences or workshops

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :52 2009 : 52 2010 : 52 2011 :52 2012 : 52

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of Grant submissions

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :18 2009 : 15 2010 : 15 2011 :15 2012 : 15

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of agencies better informed about amphibian habitat needs

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :3 2009 : 3 2010 : 3 2011 :3 2012 : 3

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 315 - Animal Welfare/Well-Being and Protection

1. Outcome Target

Use of more precise biological data in making water quality statements

2. Outcome Type : Change in Condition Outcome Measure

2008 :10 2009 : 10 2010 : 10 2011 :10 2012 : 10

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Use of biological data by aquatic entomologists

2. Outcome Type : Change in Condition Outcome Measure

2008 :100 2009 : 100 2010 : 100 2011 :100 2012 : 100

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management

- 123 - Management and Sustainability of Forest Resources
- 136 - Conservation of Biological Diversity

1. Outcome Target

Number in audience of meeting presentations

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1000 2009 : 1000 2010 : 1000 2011 :1000 2012 : 1000

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of resources managers addressed

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 2009 : 5 2010 : 5 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources

1. Outcome Target

Number of workshops held

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :10 2009 : 10 2010 : 10 2011 :10 2012 : 10

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals

- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Number of websites developed

2. Outcome Type : Change in Condition Outcome Measure

2008 :6 2009 : 6 2010 : 6 2011 :6 2012 : 6

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals
- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Public service announcement

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management

1. Outcome Target

Number of trade publications

2. Outcome Type : Change in Action Outcome Measure

2008 :10 2009 : 10 2010 : 10 2011 :10 2012 : 10

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 122 - Management and Control of Forest and Range Fires
- 123 - Management and Sustainability of Forest Resources
- 132 - Weather and Climate
- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals

- 315 - Animal Welfare/Well-Being and Protection
- 403 - Waste Disposal, Recycling, and Reuse
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Lake Management plans that consider biotoxin problems

2. Outcome Type : Change in Action Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 135 - Aquatic and Terrestrial Wildlife

1. Outcome Target

Development of NH state drinking water program with biotoxin control

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 136 - Conservation of Biological Diversity

1. Outcome Target

Foresters learning about methods to reduce spread of invasive species

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 315 - Animal Welfare/Well-Being and Protection

1. Outcome Target

Identification of invasive species

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :10 2009 : 10 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occuring Toxins, and Other Hazards Affecting Animals

1. Outcome Target

CZM manager, environmental resource groups/individuals

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :25 2009 : 25 2010 : 25 2011 :25 2012 : 25

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources
- 136 - Conservation of Biological Diversity
- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Dissemination of results to land ure planners

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :1 2009 : 0 2010 : 1 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 123 - Management and Sustainability of Forest Resources

1. Outcome Target

websurveys

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Questionnaire

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

1. Outcome Target

Enhance knowledge of lobsters, improve management; educate community

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :300 2009 : 300 2010 : 300 2011 :300 2012 : 300

3. Associated Knowledge Area(s)

- 135 - Aquatic and Terrestrial Wildlife
- 136 - Conservation of Biological Diversity

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Competing Public priorities
- Natural Disasters (drought,weather extremes,etc.)
- Appropriations changes
- Competing Programatic Challenges
- Public Policy changes
- Populations changes (immigration,new cultural groupings,etc.)
- Government Regulations
- Economy

Description

One or more external factors may have adverse or positive effects on the program and/or project.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Time series (multiple points before and after program)
- Before-After (before and after program)

Description

During each project, data are analyzed and research is evaluated. Project 1: Amphibian growth and survival will be examined every week. Comparisons of treatment effects will be evaluated statistically. Project 2: Reference sites will be maintained and sampled yearly to check for any long-term changes. Project 3: Evaluate the accuracy of each technique using an error matrix approach. Projects 4, 5: Floristic studies. Project 6: Future validation of long-term predictors. Project 7: Quantification of microbial community structure. Project 8: Time series data on shellfish densities and sizes on all monitored reefs are assessed annually. Project 9: Formal and informal observations to determine how research results are being used. Project 11: Field and laboratory studies will be conducted. Project 12: Genetic analysis of dispersal. Project 13: Invasive shrubs will be examined using wood-ring analysis under silvicultural treatment that include clear-cutting, group selection, selective cutting and no treatment. Project 14: Compare sites with and without invasive shrubs. Project 15: Changes in invertebrate communities can be detected using genetics; new invasives can be detected and their origins can be determined. Project 16: Comparison of species composition temporally and spatially, i.e. before and after impacts (sewage discharge, etc.); comparison of impacts of introduced species on other coastal resources (e.g. shellfish). Project 17: Time series before and after organic dairy initiation. Project 18: Experimental designs and evaluation will be used. Project 19: Lobsters will be tracked for one month (20 lobsters per year). GIS/ArcView will be used to calculate daily home ranges.

2. Data Collection Methods

- Other (Field and Lab research)
- On-Site
- Observation
- Whole population
- Structured
- Mail
- Sampling
- Case Study
- Unstructured

Description

Various physiological, field, molecular and laboratory techniques will be used to collect data. Specific techniques include snout vent length; growth rates; measurement of soil temperatures; canopy cover; air temperature; rainfall; insect abundance/biomass/diversity using pitfall traps; need to observe/measure the components of the forest (species, crown closure) to compare to the maps generated remotely sensed imagery; determine vegetation, abundance, percent cover and full inventory; specimens are deposited in the herbarium; Herbarium records become permanent documentation; field measurement of forest growth, structure, mortality, and litterfall; capture of historic data from archived sources; mail survey of foresters on knowledge and training needs; soil analyzed by biogeochemistry and soil microbiology; replicate quadrat samples of all bivalves shellfish; counting and measuring all animals collected; mail and face to face surveys of general public and targeted populations; ELISA tests for microcystins; multiparameter probe profiles of physical and chemical conditions in lakes; random plot sampling used to select shrubs; benthic macrofaunal invertebrates will be collected along with GPS information and habitat data; standard PCR and DNA sequencing; a variety of statistical analysis; analyze water samples; and use of fixed-array ultrasonic telemetry system.

V(A). Planned Program (Summary)

1. Name of the Planned Program

Pest Management

2. Brief summary about Planned Program

Project 1: This project seeks to understand how hormones control reproductive physiology and behavior of beetles that are opportunistic breeders. Multiple species are used as a model system this group displays a variety of life histories.

3. Program existence : Mature (More than five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

- 215 100% Biological Control of Pests Affecting Plants

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Little is known about the hormonal control of reproduction by beetles, many of which are pests. Better understanding of the endocrine processes will lead to better and safer methods of pest control.

2. Scope of the Program

- In-State Research
- Multistate Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Juvenile hormone plays an important role in regulating reproductive physiology or behavior, or both.

2. Ultimate goal(s) of this Program

To understand the physiological control of the complex reproductive behavior, which includes elaborate parental care of burying beetles.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	0.3	0.0
2009	0.0	0.0	0.3	0.0
2010	0.0	0.0	0.3	0.0
2011	0.0	0.0	0.3	0.0
2012	0.0	0.0	0.3	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students and/or postdoctoral fellows. Beetles of several species will be trapped locally. Hemolymph will be taken at designated times and during a reproductive bout and will be analyzed using radioimmunoassay for juvenile hormone titers.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● Other 2 (Laboratory research) ● Other 1 (Field Research) 	<ul style="list-style-type: none"> ● TV Media Programs ● Other 1 (Peer reviewed publications)

3. Description of targeted audience

Target audience will include students in university classrooms and K-12, and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences. Scientists in behavioral ecology or behavioral endocrinology.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	50	50	0	0
2009	50	50	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	0	0
2009	0	0
2010	0	0
2011	0	0
2012	0	0

V(H). State Defined Outputs

1. Output Target

- Peer Reviewed Publications

2008 :1 2009 :1 2010 :0 2011 :0 2012 :0

- Chapters in Books

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

- Non peer reviewed publications including abstracts

2008 :1 2009 :0 2010 :0 2011 :0 2012 :0

V(I). State Defined Outcome

1. Outcome Target

Peer Reviewed Publications

2. Outcome Type : Change in Condition Outcome Measure

2008 :1 2009 : 1 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 215 - Biological Control of Pests Affecting Plants

1. Outcome Target

Increase in knowledge

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :0 2009 : 0 2010 : 0 2011 :0 2012 : 0

3. Associated Knowledge Area(s)

- 215 - Biological Control of Pests Affecting Plants

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought,weather extremes,etc.)

Description

Natural disaster such as drought or floods would adversely affect the project.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)
- Before-After (before and after program)
- Time series (multiple points before and after program)

Description

During each project, data are analysed and research evaluated. Comparison of treatments using common statistical tests at regular intervals. Juvenile hormone titers are compared.

2. Data Collection Methods

- Sampling
- Other (Physiology and Field Studies)

Description

Physiological and Field techniques will be used including behavioral assays and experiments and radioimmunoassays.

V(A). Planned Program (Summary)**1. Name of the Planned Program**

Plants & Plant Products

2. Brief summary about Planned Program

Project 1: This project seeks to identify genetic mechanisms involved in plant responses to DNA damage in the model plant *Arabidopsis thaliana*. Project 2: This project will determine whether plants have a generalized response to abiotic stress at the cellular and tissue level of organization. Project 3: This project will take a multi-disciplinary approach to plant breeding, production, integrated pest management, and shipping of vegetatively propagated young plants for horticulture. Project 4: This project aims to identify cultivars of fruit and vegetable varieties that are well adapted to NH. The ultimate objective is to expand the number of crops that can be grown profitably in NH or to expand knowledge, profitability, or growing season of existing crops. Project 5: This project will investigate the role of iron deficiency in altering and reducing the effectiveness of anti-oxidant systems in limiting damage and stress to photosynthesis. Project 6: The primary objective of this project is to improve eating quality and nutritional value of new varieties of squash, primarily within the species *Cucurbita maxima* and *Cucurbita moschata*. Nutritional research will be focused on developing varieties of squash that are high in overall carotenoid content, and have high levels of specific carotenoids beta-carotene, lutein and zeaxanthin. Project 7: This project investigates ways to modify container production systems for northern nurseries that will lower production costs and improve profitability. This should result in more local production of landscape plants that are suitable for the region. Project 8: This project is using molecular techniques to identify the taxonomy of the commercially important seaweed, *Porphyra*.

3. Program existence : Mature (More than five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)**1. Program Knowledge Areas and Percentage**

- 136 5% Conservation of Biological Diversity
- 201 20% Plant Genome, Genetics, and Genetic Mechanisms
- 202 15% Plant Genetic Resources
- 203 10% Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 5% Plant Product Quality and Utility (Preharvest)
- 205 10% Plant Management Systems
- 206 15% Basic Plant Biology
- 211 10% Insects, Mites, and Other Arthropods Affecting Plants
- 212 5% Pathogens and Nematodes Affecting Plants
- 216 5% Integrated Pest Management Systems

V(C). Planned Program (Situation and Scope)**1. Situation and priorities**

Project 1: To better understand ways to improve crops in response to abiotic stress such as DNA damage. Project 2: This study will deal with a little studied aspect of stress response--that is cell and tissue structural responses. It will further our overall understanding of plant responses to stress and will perhaps affect the direction of plant breeding for enhanced resistance to various abiotic stresses. Project 3: Ornamental plant production and landscaping are the major agricultural sector in NH. Vegetatively-propagated genetics are one of the fastest-growing areas within that industry. Project 4: To attain ecological and economic sustainability, NH fruit and vegetable growers must minimize crop production costs and maintain high crop quality and yields. Applied NH-based agricultural research is needed to identify crops, crop varieties, and production practices that are best suited to these conditions. Project 5: Iron scarcity in the oceans is one of two major limiting factors in primary productivity at the bottom of the food chain. The role of iron in both increasing and ameliorating oxidative stress is poorly understood. Project 6: Squash together with pumpkin are the second leading vegetables in New England in terms of production acreage. Current popular acorn cultivars being used by growers lack acceptable eating quality. Project 7: By developing better production systems in

nurseries and over-wintering techniques, local production costs can be reduced and profitability increased, resulting in better local availability of appropriate landscape plants. Project 8: Native species may be useful for aquaculture.

2. Scope of the Program

- In-State Research
- Multistate Integrated Research and Extension
- Multistate Extension
- Multistate Research
- In-State Extension
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Project 1: To find new mechanisms in plants involved in responses to abiotic stress. Arabidopsis will serve as an excellent model system for crop species. Project 2: Different detection pathways will converge on a very limited number of cytological and tissue structural responses. Project 3: New plant genetics will be introduced to industry. Greenhouse production and shipping will be more efficient and with less negative environmental impacts. Project 4: Funding will remain constant or increase. Existing farm staffing will continue. Project 5: It is hypothesized that iron deficiency will adversely affect the key anti-oxidant enzymes superoxide dismutase, catalase, and ascorbate peroxidase and will also produce depletion of the key substrates ascorbic acid and vitamin E. Project 6: The assumptions are that it will be possible to develop new squash varieties with high levels of carotenoids and also varieties that have high proportions of specific carotenoids. Project 7: Sustained growth in housing and development maintains high demand for landscape plants. Research results in a more economical method for over-wintering container-grown plants. Project 8: There are many more species of Porphyra than have been previously described.

2. Ultimate goal(s) of this Program

Project 1: Better crops, better understanding of the genetic mechanisms of plants. Project 2: To understand the involvement of cell and tissue structural changes in responses to plant stress and eventually the mechanisms by which those changes are effected. Project 3: To improve profitability of greenhouse production of young plants, increase plant quality for the consumer, and reduce runoff and other negative impacts of agriculture on the environment. Project 4: To identify NH-adapted fruit and vegetable varieties and growing practices that help NH fruit and vegetable growers innovate so that NH farms remain profitable. Project 5: To allow meaningful predictions of the quantitative effects of iron limitation on net primary productivity due to oxidative stress. How much ocean's productivity could be increased without extreme iron deficits can be estimated. Project 6: The ultimate goals are to release new varieties of Cucurbita maxima and C. moschata squash with high levels of carotenoids, and that the improved nutritional benefits of these varieties can be used as a marketing tool to introduce them to consumers. Project 7: To modify production systems for nursery crops, resulting in lower production costs and more profitability for northern nurseries. Project 8: To sort out the taxonomy of Porphyra species native to the Northeast, and to identify the presence and source of non-native invasive species.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	0.0	0.0	1.2	0.0
2009	0.0	0.0	1.2	0.0
2010	0.0	0.0	1.2	0.0
2011	0.0	0.0	1.2	0.0
2012	0.0	0.0	1.2	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

For all projects: Manuscripts will be submitted to peer reviewed journals. Presentations will be given at regional, national and/or international meetings. Grant proposals will be submitted. There will be training of undergraduate students, graduate students and/or postdoctoral fellows. There will be development and maintenance of websites. Presentations will be made to various traditional and non-traditional stakeholders. Project 1: This project will identify genetic mechanisms involved in plant responses to DNA damage. Project 2: This project will provide information to plant breeders who are interested in abiotic stress in plants. Project 3: Research nutrition, lighting and temperature during propagation; identify effective and low-impact controls of borytis in shipping and fungus gnats during production; investigate genetics of Nolara, Anagallis, and Browallia and develop new cultivars. Project 4: Evaluate newly developed cultivars of vegetable and fruit crops to identify those that well adapted to NH. Evaluate season extension techniques to expand the number of crops that can be grown profitably in NH or that expand growing seasons of existing crops. Project 5: This project will determine the role of iron deficiency during photosynthesis. Project 6: Vegetable twilight meetings; grower meetings; extension bulletins; seed catalogs; and seed samples to selected growers. Project 7: Conduct field trials and demonstrations leading to improved nursery production systems. Disseminate results of research to growers through seminars and publications. Project 8: Diverse coastal habitats for all porphyra species will be sampled. Morphology and DNA sequences will be compared to holotype specimens from international herbaria. New species will be formally described.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
<ul style="list-style-type: none"> ● One-on-One Intervention ● Other 1 (Laboratory research) ● Education Class ● Workshop ● Group Discussion ● Demonstrations 	<ul style="list-style-type: none"> ● Newsletters ● Other 1 (Peer reviewed publications) ● Other 2 (Meetings; industry trade magazin) ● Web sites

3. Description of targeted audience

Target audience will include students in university classrooms and K-12, and various stakeholder groups. For indirect contacts, each of the projects will continue to have websites, submit peer review publications and present at regional, national or international conferences. Other researchers and scientists in the appropriate discipline. Project 3: All greenhouse growers in the US and cutting producers overseas. Project 7: Nursery owners/managers/growers/extension educators in the state and region.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	1460	10490	10	20
2009	1610	10990	10	20
2010	960	10990	10	0
2011	960	10990	10	0
2012	960	10990	10	0

2. (Standard Research Target) Number of Patents

Expected Patents

2008 :2 2009 :2 2010 :2 2011 :2 2012 :0

3. Expected Peer Review Publications

Year	Research Target	Extension Target
2008	7	0
2009	8	0
2010	9	0
2011	5	0
2012	5	0

V(H). State Defined Outputs

1. Output Target

- Peer-reviewed publications

2008 :7 2009 :8 2010 :9 2011 :5 2012 :5

- Chapters in Books

2008 :0 2009 :0 2010 :0 2011 :0 2012 :0

- Non-peer reviewed publications including abstracts

2008 :17 2009 :15 2010 :13 2011 :13 2012 :13

V(I). State Defined Outcome

1. Outcome Target

Peer Reviewed Publications

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :7 2009 : 8 2010 : 9 2011 :5 2012 : 5

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Number of Graduate Students Trained

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :4 **2009 : 4** **2010 : 3** **2011 :3** **2012 : 3**

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Number of Undergraduate students trained and/or performing investigations

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :5 **2009 : 5** **2010 : 5** **2011 :5** **2012 : 5**

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Number of presentations/posters at regional, national or international conferences or workshops

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :12 **2009 : 12** **2010 : 8** **2011 :8** **2012 : 8**

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Change in Knowledge in field

2. Outcome Type : Change in Action Outcome Measure

2008 :1000 **2009 :** 1000 **2010 :** 1000 **2011 :**1000 **2012 :** 1000

3. Associated Knowledge Area(s)

- 136 - Conservation of Biological Diversity
- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 206 - Basic Plant Biology
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Growers improve water & fertilizer use

2. Outcome Type : Change in Action Outcome Measure

2008 :150 **2009 :** 150 **2010 :** 150 **2011 :**150 **2012 :** 150

3. Associated Knowledge Area(s)

- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 205 - Plant Management Systems

1. Outcome Target

Growers improve fungus gnat management

2. Outcome Type : Change in Condition Outcome Measure

2008 :300	2009 : 300	2010 : 300	2011 :300	2012 : 300
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3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Growers improve borytis management

2. Outcome Type : Change in Condition Outcome Measure

2008 :100	2009 : 100	2010 : 100	2011 :100	2012 : 100
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3. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 212 - Pathogens and Nematodes Affecting Plants
- 216 - Integrated Pest Management Systems

1. Outcome Target

Growers adopt new genetics or new technology

2. Outcome Type : Change in Condition Outcome Measure

2008 :1500	2009 : 500	2010 : 500	2011 :500	2012 : 500
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3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources

1. Outcome Target

No. of farmers learning about new vegetable varieties

2. Outcome Type : Change in Action Outcome Measure

2008 :150	2009 : 150	2010 : 150	2011 :150	2012 : 150
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3. Associated Knowledge Area(s)

- 202 - Plant Genetic Resources
- 205 - Plant Management Systems

1. Outcome Target

No. of farmers learning about new fruit varieties

2. Outcome Type : Change in Action Outcome Measure

2008 :0	2009 : 100	2010 : 100	2011 :100	2012 : 100
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3. Associated Knowledge Area(s)

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources

- 205 - Plant Management Systems

1. Outcome Target

No. of farmers learning about season extension

2. Outcome Type : Change in Action Outcome Measure

2008 :150

2009 : 150

2010 : 150

2011 :150

2012 : 150

3. Associated Knowledge Area(s)

- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Natural Disasters (drought,weather extremes,etc.)
- Competing Programatic Challenges
- Government Regulations
- Economy

Description

One or more factors may adversely or improve the outcome of the project.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Description

During each project, data are analyzed and research is evaluated. Project 2: Comparisons between osmotic and mechanically stressed sunflower leaves versus non stressed controls. Project 3: Annual meetings with organizations and companies that serve multiple growers to review the impacts of our projects. Project 4: Surveys and interviews at multiple points before, during and after program. Project 6: New hybrids will be tested in experimental plots for fruit yield, quality attributes, partitionial biomass and population density. Project 7: Plant response to production system modification; personal obervation and informal survey of stakeholders to indicate adoption of new practices. Project 8: Number of species of Porphyra known before study versus those known after.

2. Data Collection Methods

- Sampling
- Case Study
- Whole population
- Journals
- Other (Molecular, cellular, biochemical)
- Observation

Description

Standard laboratory methods/techniques in genetics and molecular biology are employed for two of the projects such as DNA sequencing and PCR. Other projects use one or more of the following techniques: physiological; cellular; microscopy; greenhouse; on-farm trials; laboratory research; measurement and observation of agronomic variable in controlled field experiments; determination of biomass and quality and nutritional factors of cultivars; carbohydrate analyses of root samples; electrolyte

leakage assays; and morphological measurements.